Phase equilibria in the SrO - Sc2O3 - CuO system with emphasis on the Sr14Cu24O41-phase (poster)

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PHASE EQUILIBRIA IN THE SrO – Sc_2O_3 – CuO SYSTEM WITH EMPHASIS ON THE $Sr_{14}Cu_{24}O_{41-\delta}$ PHASE

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The sub-solidus phase relations in the Sc_2O_3 – SrO – CuO system were determined at 900°C in air (see Fig. 1). Like in the case of SRE_2O_3 – SrO – CuO systems with SRE = small rare-earth elements, no ternary compound was formed. However, the Sc_2O_3 – SrO – CuO system is dominated by the Sc_2SrO_4 phase, which is in equilibrium with all other phases. This is not the case in SRE_2O_3 – SrO – CuO systems, where the $SRE_2Cu_2O_5$ phase is in equilibrium with $Sr_{14}Cu_{24}O_{41-\delta}$.[1] We confirm that the $Sr_{14}Cu_{24}O_{41-\delta}$ phase is slightly Cu-deficient[2], its formulation being closer to $Sr_{14}Cu_{23.5}O_{41-\delta}$.

While all rare-earth elements substitute on the Sr sites in the $Sr_{14}Cu_{24}O_{41}$ phase, Sc appears to partially replace Cu instead. This difference can be understood on the basis of ion size considerations. The solubility limit of Sc is low and amounts to about 2 at%. This substitution results in a shrinkage of the c-axis (running along the chains and ladders of the structure) by 0.3%.

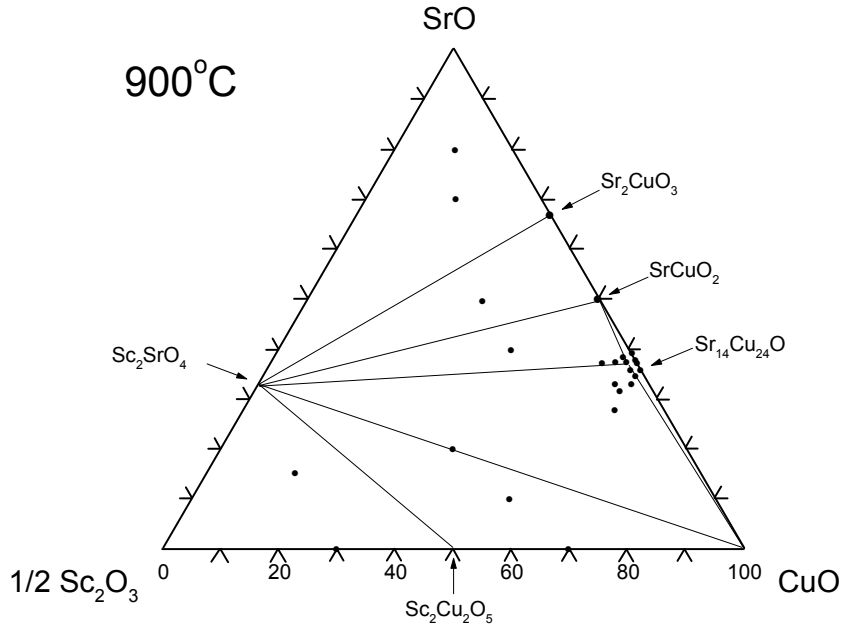

Fig. 1. Phase equilibria in the Sc_2O_3 – SrO – CuO system at 900°C in air

REFERENCES

1. W. Wong-Ng et al., Int. J. Inorg. Mater. **3** (2001) 1283
2. E.M. McCarron et al., Mat. Res. Bull. **23** (1988) 1355